

PLAN VIEW OF SYSTEM LAYOUT

(INCLUDE FOUNTAIN AND LINE NUMBERS)

NOT TO SCALE

| | MAIN #1 | SPUR #2 | SPUR #3 | SPUR #4 |
|-------------------------|---------|---------|---------|---------|
| PIPE DIAMETER | | | | |
| PIPE LENGTH | | | | |
| PRESSURE REDUCER Y OR N | | | | |
| FOUNTAIN ELEV. | | | | |
| FOUNTAIN TYPE | | | | |
| FOUNTAIN STA | | | | |
| TEE @ STA ON MAIN | XX | | | |

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES.
2. THE TRENCH SHALL BE FREE OF ROCKS AND OTHER SHARP EDGED MATERIALS.
3. THE PIPE SHALL BE PLACED IN A "SNAKE LIKE" POSITION IN THE TRENCH.
4. TURN ON THE WATER AND CHECK FOR LEAKS PRIOR TO BACKFILLING THE TRENCH.

| BILL OF MATERIALS | | |
|-------------------|-----------|---------------------------------|
| QUANTITIES | UNIT | ITEM |
| | EACH | ____ BALL FOUNTAIN |
| | EACH | ____ BALL FOUNTAIN |
| | LIN. FEET | ____ " _____ PIPE |
| | LIN. FEET | ____ " _____ PIPE |
| | LIN. FEET | ____ " _____ PIPE |
| | EACH | ____ " _____ ELBOWS |
| | EACH | ____ " _____ ELBOWS |
| I | EACH | ____ BACKFLOW PREVENTION DEVICE |
| | EACH | ____ PRESSURE REDUCER |
| 3 (PER FOUNTAIN) | FEET | 15' POLYETHYLENE TUBE |
| 70 (PER FOUNTAIN) | SQ. YDS. | NON WOVEN GEOTEXTILE |
| (PER FOUNTAIN) | CU. YD. | 3000 PSI CONCRETE |
| 20 (PER FOUNTAIN) | TONS | ROCK (06A.#8,#57,#610) |
| I | EACH | PIPE CLEANER |
| I | EACH | GLUE |
| | | |
| | | |
| | | |
| | | |

| REVISIONS | | | DRAWING NO. |
|-----------|----------|-------|-------------|
| DATE | APPROVED | TITLE | KY ENG 516A |
| 09/05 | DLC | CE | |
| | | | |
| | | | |
| | | | |
| SHEET | | | OF |



LANDOWNER: _____ COUNTY: _____

PIPELINE AND FOUNTAIN

| | DATE |
|---------------|-------|
| DESIGNED_____ | _____ |
| DRAWN_____ | _____ |
| CHECKED_____ | _____ |
| APPROVED_____ | _____ |

PRESSURIZED PIPELINE AND FOUNTAIN DESIGN

DESIGN PROCEDURE

1) Pipe and Fountain

Main #1

Spur #2

Spur #3

Spur #4

2) Type and Number of Animals

3) Fountain Description

4) Elevation of the Meter

5) Elevation of the Fountain

-

6) Change in Head from Elevation (ft.)

7) Pressure @ Meter

x 2.31

+

8) Total Available Head (ft.)

=

(if > 115 add pressure reducer)

9) Length of Pipe Along Ground Line (ft.)

(for design purposes this distance is from the meter, down the main, and out the spur)

10) Flow Rate in Pipe (see below) (g/h)

11) Length of Pipe to Install (ft.)

12) PVC Pipe Diameter (in.)

FLOW RATE IN PIPE

Fountain with little or no storage

900 gallons per hour

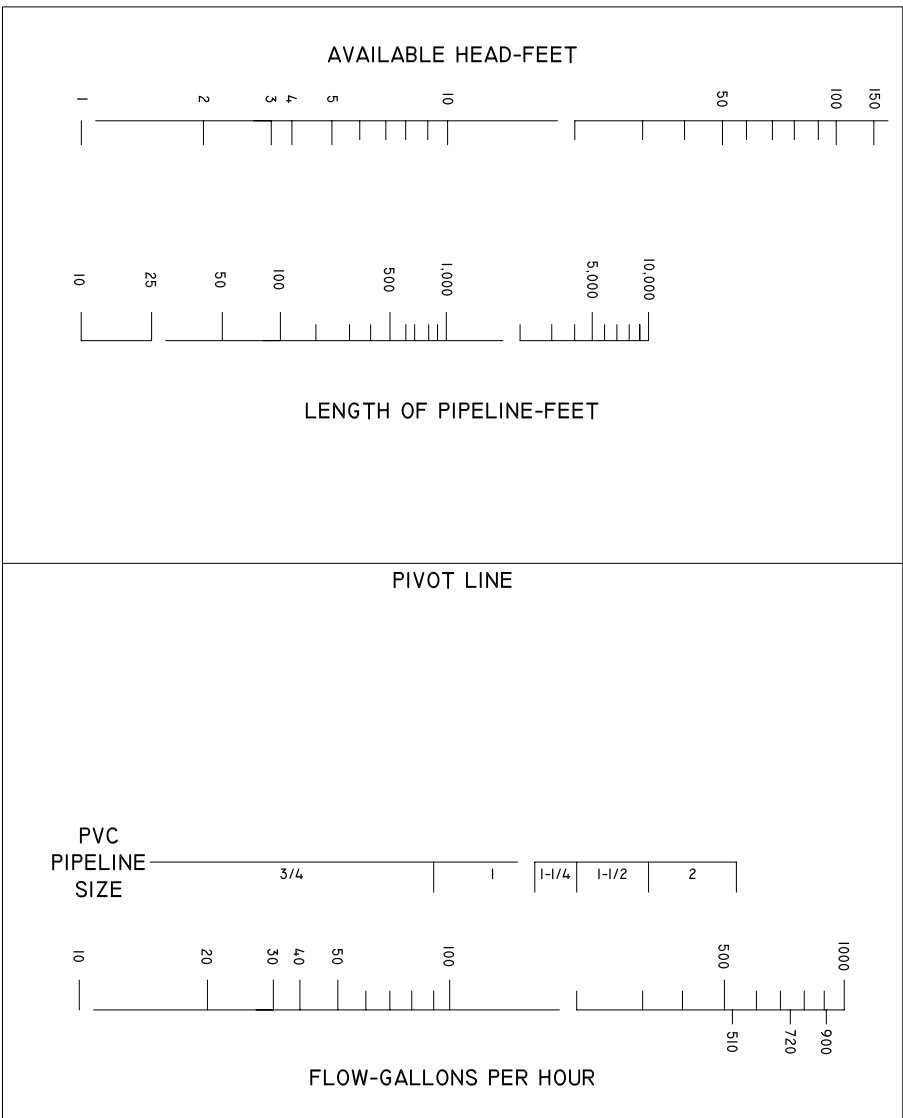
6 ball fountain

720 gallons per hour

2 or 4 ball fountain

510 gallons per hour

PIPELINE DESIGN CHART FOR LIVESTOCK WATER FACILITIES
(plot lines on this chart, see KYFOTG IV for instructions)



Design note: The main shall be designed from the meter to the farthest fountain in the system. The spurs may be a smaller size than the main.

- 1) The design survey shall have the elevation of the water meter or well pump and the elevation of each watering facility to be installed. A GPS is not accurate enough for this and it cannot be taken from a topographic map. You will also need to tape along the ground line of the proposed pipeline to determine how much pipe to design for. This can be done with a GPS with a backpack antenna. If you use a GPS, be sure to get spots close enough together to depict the ground line not the horizontal distance. Note in the taped survey or GPS survey where the spurs will be coming off the main line. The main line will usually be the one to the watering facility that is the farthest distance from the meter. However, due to more head loss in one of the spur lines, the spur with a shorter distance may actually require a larger pipe. In this case, the larger pipe would be used for the spur and from the spur out the main to the meter. Be sure to draw a plan view of the layout to accompany your survey.
- 2) Determine from the landowner which brand and type of watering facility he plans to use at each location. (i.e. MirraFount 4 ball) Make sure the particular brand and type will service the number of animals the landowner plans to have in the field at one time. If you are installing multiple fountains off one main, and cattle will be using more than one fountain at a time, just use the flow in the pipeline for one fountain. Do not multiply the flow required for a fountain by the numbers of fountains used at one time.
- 3) Determine the water pressure at the meter or well. This can be done by using a pressure gage that can be purchased at most hardware stores. You may not be able to get the pressure at the meter but you can check it at a nearby hydrant at a house or barn. The water pressure fluctuates enough during the course of a day that the water company usually will not give you a number.
- 4) Begin by designing the main. Fill in the blanks of the Pipeline and Fountain Design chart. For the main, the length of pipe along the ground line and the length of pipe to install will be the same. Using the total available head (line 8), length of pipe along the ground (line 9), and flow rate in pipe (line 10), determine the pipe size of the main.
- 5) To design the size of a spur line, use the same process except the length along the ground line (line 9) will be the length of the spur plus the length from the meter to the spur. The length of pipe to install (line 11) will be the length of the spur. The diameter of the spur line should be smaller or equal to the size of the main. If not, adjust the size of the main out to the meter as described in 1) above. Continue this process until all of the spurs have been designed.
- 6) It is best to tee off a short distance to install a fountain that is on the main line so that if necessary a pressure reducer can be installed on the spur rather than on the main line. The pipes can withstand most pressures we encounter and you may need the pressure on down the line. The fountains are what is sensitive to pressure.
- 7) Schedule 40 PVC pipe is most commonly used for these facilities. But in the event that another type of pipe (that meets the standards) is to be used, list the length and type pipe material used in the Bill of Materials on the drawing.
- 8) Any time the combination of water pressure at the meter and gained head produces a total available head (line 8) greater that 115 feet (50 psi), a pressure reducer should be installed at the watering facility.
- 9) The engineering job class will be based on the pressure, which is total available head divided by 2.31, and the length of pipe to the farthest watering facility (usually the main). Do not use the total length of the spurs too. Give a copy of the *from sheet only* to the landowner or contractor.

CONSTRUCTION CHECK

| | Main #1 | Spur #2 | Spur #3 | Spur #4 |
|--------------------------------|---------|---------|---------|---------|
| Length of Pipe (ft.)(measured) | | | | |
| Diameter of Pipe (in.) | | | | |
| Description of Pipe | | | | |
| Min. Cover | | | | |
| | #1 | #2 | #3 | #4 |
| Description of Fountain | | | | |
| Elev. of Fountain | | | | |
| Min. Projection of HUA | | | | |

To the best of my professional knowledge, judgment, and belief the installed practice meets NRCS standards.